1. A method for inducing a cell to differentiate to a neuronal cell phenotype, comprising contacting said cell with an agent which antagonizes the biological action of at least one polypeptide growth factor of the Transforming Growth Factor-β (TGF-β) family, said growth factor normally inducing said cell to differentiate to a non-neuronal phenotype.

2. The method of claim 1, wherein said antagonizing agent inhibits the biological activity of said growth factor by preventing said growth factor from binding growth factor receptors on the surface of said cell.

3. The method of claim 2, wherein said antagonizing agent binds said growth factor and sequesters said growth factor such that it cannot bind said growth factor receptors.

4. The method of claim 3, wherein said antagonizing agent is selected from a group consisting of a follistatin, an α2-macroglobulin, a protein containing at least one follistatin module, and a truncated receptor for a growth factor of the TGF-β family.

5. The method of claim 4, wherein said truncated receptor comprises a soluble growth factor-binding domain of a TGF-β receptor.

6. The method of claim 5, wherein said truncated receptor comprises a truncated activin receptor.

7. The method of claim 2, wherein said antagonizing agent inhibits binding of said growth factor with said growth factor receptors via its own binding to said growth factor receptor.

8. The method of claim 7, wherein said antagonizing agent is an inhibin.

9. The method of claim 7, wherein said antagonizing agent is a polypeptide of said TGF-β family and which has one or more sites of amino acid mutation, said mutation diminishing an ability of said TGF-β polypeptide to induce said cell to differentiate to a non-neuronal phenotype, yet not substantially diminishing the binding of said activin to said growth factor receptor.

10. The method of claim 9, wherein said TGF-β polypeptide is a mutated activin.

11. The method of claim 7, wherein said antagonizing agent is peptidyl fragment, or a peptidomimetic thereof, of a receptor-binding portion of an activin or inhibin protein.

12. The method of claim 1, wherein said antagonizing agent is an antisense nucleic acid construct which inhibits expression of a receptor for said TGF-β polypeptide.

13. The method of claim 1, wherein said antagonizing agent is dominant negative TGF-β receptor comprising an extracellular growth factor-binding domain of a TGF-β receptor, a transmembrane domain for anchoring said extracellular domain to a cell surface membrane, and a dysfunctional cytoplasmic domain, said dominant negative receptor being recombinantly expressed in said cell and inhibits the biological activity of said growth factor by inhibiting signal transduction by a naturally-occurring TGF-β receptor.

14. The method of claim 1, wherein said growth factor is activin.

15. The method of claim 1, wherein said cell is further contacted with a second growth factor having neurotrophic or neural inductive activity, such as a nerve growth factor, cilliary neurotrophic growth factor, schwanoma-derived growth factor, glial growth factor, striatal-derived neuronotrophic factor, platelet-derived growth factor, scatter factor, a vertebrate *hedgehog* protein, noggin, and a ligand for a *Notch* receptor.

16. The method of claim 1, wherein said cell is part of a host organism, and said antagonistic agent is delivered in the form of an *in vivo* therapeutic formulation.

17. The method of claim 1, wherein said neuronal cell comprises a neural progenitor cell.

18. The method of claim 1, wherein said neuronal cell is selected from a group consisting of a melanocyte progenitor cell, a glial progenitor cell, a sensory neuron progenitor cell, a sympatho-adrenal progenitor cell, a parasympathetic progenitor cell, and an enteric progenitor cell.

19. The method of claim 1, wherein said neuronal cell is a terminally-differentiated neuronal cell.

20. The method of claim 19, wherein said terminally-differentiated neuronal cell is selected from a group consisting of a microglial cell, a macroglial cell, a schwann cell, a cholinergic cell, a peptidergic cell, and a serotenergic cell.

21. The method of claim 1, wherein said cell is selected from a group consisting of an embryonic cell, a fetal cell, and a neonatal cell.

22. A method for preventing death of a neuronal cell comprising contacting said cell with an agent which antagonizes the biological action of at least one polypeptide growth factor of the Transforming Growth Factor-β (TGF-β) family, said growth factor normally inducing said cell to differentiate to a non-neuronal phenotype.

23. The method of claim 22, wherein said antagonizing agent is selected from a group consisting of a follistatin, a truncated activin receptor, an α2-macroglobulin, an inhibin, and an antagonistic mutant of a polypeptide growth factor of the TGF-β family.

24. The method of claim 22, wherein said cell is further contacted with a second growth factor having neurotrophic activity, such as a nerve growth factor, cilliary neurotrophic growth factor, schwanoma-derived growth factor, glial growth factor, stiatal-derived neuronotrophic factor, platelet-derived growth factor, scatter factor, a vertebrate *hedgehog* protein, noggin, and a ligand for a *Notch* receptor.

25. A method for inducing a cell to differentiate along a determined neuronal pathway comprising, contacting said cell with an agent which disrupts a signaling pathway in said said cell of a growth factor of the TGF-β family, said signaling pathway normally inducing said cell to differentiate to a non-neuronal cell-type.

26. The method of claim 25, wherein said signaling pathway is an activin-signaling pathway.

27. A method for identifying a neuralizing activity, comprising
    (i) culturing animal cap cells derived from an embryo, or equivalent cells thereof, in the presence of a polypeptide growth factor of the TGF-β family, said growth factor normally inducing said cells to differentiate to a non-neuronal phenotype,
    (ii) contacting said cells with a candidate agent, and
    (iii) detecting the neuronal differentiation of any of said cells,

    wherein neuronal differentiation of said cells in the presence of said candidate agent is indicative of a neuralizing activity.

28. The method of claim 27, wherein said growth factor is activin.

29. The method of claim 27, wherein said neuronal differentiation is detected by scoring for the presence of a neural-specific marker on the surface of said cells.

30. The method of claim 29, wherein said neural specific marker is NCAM, and the presence of NCAM is scored using a detectably labeled anti-NCAM antibody.